REMARKS

In response to the Office Action mailed August 28, 2006 (Paper No. 20060810), claims 15, 20, 29, 30 and 33 have been amended. Non-elected claims 1-14, 16-19, 24, 26-28 and 38 are cancelled. New claims 39-42 are presented. As such, claims 15, 20-22, 25, 29-37, 39 and 42 are pending in the application. Support for the amendments to claim 20 is submitted to be found at page 18, lines 13-16. Support for the amendments to claim 29 is found on page 22, lines 12-14. Support for the amendment to claim 33 is found in original claim 1 as filed. Support for the remaining amendments is found in the claims as filed. As a result, it is submitted that no new matter has been added to the application by way of these amendments.

Claims 29, 32, 33, 35, 37 and 39 currently stand rejected under 35 U.S.C. §102(a, e) as anticipated by LaPierre et al. (U.S. 6,348,278). Claims 29, 32, 33, 35, 37 and 39 also stand rejected under 35 U.S.C. §103(a) over LaPierre et al. in view of Verrill et al. (U.S. 5,938,800). Claims 20-22 stand rejected under 35 U.S.C. §103(a) over Verrill et al. in view of Keskar (U.S. 6,106,591). Claim 25 is rejected under 35 U.S.C. §103(a) as being unpatentable over Verrill et al. in view of Keskar et al. and further in view of Epp et al. (U.S. 6,063,515). Claim 15 is rejected under 35 U.S.C. §103(a) as being unpatentable over LaPierre '278 in view of Keskar et al. and further in view of Prasad (U.S. 5,226,932). Claim 30 is rejected under 35 U.S.C. §103(a) as being unpatentable over LaPierre '278 in view of Keskar et al. and further in view of Han et al. (U.S. 6,896,709). Claim 31 stands rejected under 35 U.S.C. §103(a) as being unpatentable over the applied references (LaPierre '278 in view of Keskar et al. and further in view of Han '709) and further in view of Epp et al. '515. Claim 34 stands rejected under 35 U.S.C. §103(a) as being unpatentable over LaPierre '278 in view of Keskar et al. and further in view of Edlund

et al. (U.S. 6,383,670). Claim 36 stands rejected under 35 U.S.C. §103(a) as being unpatentable over LaPierre '278 in view of Keskar et al. and further in view of Edlund et al.

Claim 20 stands rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,923,944 in view of Keskar et al.

Remarks Directed to Rejection of Claims 29, 32, 33, 35, 37 and 39 under 35 U.S.C. §102(a, e) as Anticipated by LaPierre et al.

Independent claim 29 in current form recites "a needle valve in parallel with said back pressure regulator ...."

As LaPierre et al. neither teaches nor contemplates a needle valve in parallel with a back pressure regulator, independent claim 29 and those claims that depend therefrom are now submitted to be patentably distinct from LaPierre et al. This reference fails to detail every element of the claimed invention identically shown therein. With respect to dependent claims 33, 35 and 37, Applicant submits that the subject matter of these dependent claims defines patentable subject matter separate from dependency from claim 29, now believed to be in allowable form. Applicant reserves the right to make of record arguments with regard to the patentability of these claims in due course of the prosecution. Claim 39 which is dependent from claim 20 is submitted to be novel over LaPierre et al. as a matter of law and base claim 20 from which it depends has not been determined to be anticipated by LaPierre et al.

In light of the above amendments and remarks, reconsideration and withdrawal of the rejection as to claims 29, 32, 33, 35, 37 and 39 under 35 U.S.C. §102(a, e) as being anticipated by LaPierre et al. is requested.

Remarks Directed to Rejection of Claims 29, 32, 33, 35, 37 and 39 under 35 U.S.C. §103(a) over LaPierre et al. in View of Verrill et al.

Applicant respectfully submits that the claims subject to this rejection recite an element not found in the prior art and as such this recitation is entitled to patentable weight. This recitation specifically includes "a needle valve in parallel with said back pressure regulator" and usage of a burner to heat both reactor and purifier system components.

Applicant hereby incorporates by reference the above remarks with respect to the limitations of LaPierre et al. noting that this reference is wholly devoid of a teaching or contemplation of a needle valve in parallel with a back pressure regulator. It is further submitted that Verrill et al. fails to afford a teaching sufficient to bolster LaPierre et al. in respect to inclusion of a needle valve parallel to a back pressure regulator. On this basis alone, it is respectfully submitted that a *prima facie* case of obviousness has been successfully rebutted.

Additionally, with respect to the integration of the purifier-reactor according to the present invention, it was stated in Paper No. 20060810 that "Thus, it would have been obvious in view of Verrill et al. '800 to one having ordinary skill in the art to modify the apparatus of LaPierre by making the purify system integrally with the reactor provide a compact system." (Page 4, lines 16-18). Applicant submits that such an improvement of rendering a system more compact and therefore thermally more efficient is such a desirous improvement that if one of ordinary skill in the art had capacity to make such an improvement it would have been done. Rather, Applicant submits that improved efficiency and reduced system size are always desirous and the achievement of such a result constitutes the very concept of a nonobvious improvement over the prior art as if it would have been feasible before the present invention, it would have been accomplished. Reliance on MPEP 2144.04 is submitted to be misplaced since reduction of

size and efficiency is beyond the realm of the teachings of *Schenck v. Nortron Corp.* and *In re Larson* which merely speak to the choice of a given parameter among a range of acceptable choices.

The subject matter of dependent claims 33, 35 and 37 is also believed to be patentable separate from dependency from base claim 29, now believed to be in allowable form. Also, claim 39 depends from claim 20, now believed to be in allowable form based on the following remarks.

In light of the above remarks, reconsideration and withdrawal of the rejection as to claims 29, 32, 33, 35, 37 and 39 under 35 U.S.C. §103(a) over LaPierre et al. in view of Verrill et al. is requested.

Remarks Directed to Rejection of Claims 20-22 under
35 U.S.C. §103(a) over Verrill et al. in View of Keskar et al.

Reconsideration of the outstanding rejection is requested on the basis of the operational differences between independent claim 20 in current form in using raffinate expansion to compress liquid feed.

Verrill et al. is cited for teaching an equivalent to the raffinate compressor (venturi) of pending claims 20 and 21 through a teaching of a turboexpander 310 (Paper No. 20060810, page 5, section 3). Verrill et al. at column 6, lines 31-37 is submitted to make clear that off-gases emitted from the turboexpander are "depressurized off-gases 315" that are feed to a burner. Verrill et al. is silent as to using this process to simultaneously compress liquid feed to the reactor.

Likewise, Keskar teaches a retentate purge gas stream 92 being combined with a high pressure reactive gas stream 100 to yield a high pressure gas stream 107 and enters a venturi

eductor 108 to purge the permeate side 88b of the oxygen ion transport membrane 88. Applicant submits that there is no coupling of venturi eductor 108 in Keskar et al. to a liquid feed that compresses a liquid feed. As a result, Applicant submits that the combination of Verrill et al. and Keskar et al. necessarily fails to function like the claimed invention in this regard.

In light of the above remarks, reconsideration and withdrawal of the rejection as to claims 20-22 under 35 U.S.C. §103(a) over Verrill et al. and further in view of Keskar et al. is requested.

In addition to the allowability of claim 25 on the basis of dependency from claim 20, now believed to be in allowable form, Applicant submits that the subject matter of claim 25 is in itself patentable.

Remarks Directed to Rejection of Claim 25 under 35 U.S.C. §103(a) over Verrill et al. in View of Keskar et al. and Further in View of Epp et al.

Verrill et al. and Keskar et al. are cited as teaching the claim elements of independent claim 20 and dependent claim 25 with the exception of an oxygen sensor. To bolster this limitation of Verrill et al. and Keskar et al., Epp et al. is cited as teaching an oxygen sensor 361 at the burner outlet stream 321 of the catalytic burner 319 to maintain the oxygen concentration of the burner outlet stream.

In addition to Verrill et al. and Keskar et al. failing to disclose at least one of an oxygen sensor, this prior art reference combination also fails to teach the simultaneously expansion of raffinate gas and liquid feed compression. In addition, the combination of the oxygen sensor 361 of Epp et al. with the fuel conversion system 10 of Verrill et al. provides for an oxygen sensor that detects the oxygen content of hot fluid gases 250 produced by the burner 220, but with no ability to control fan means 280. In the alternative, if the oxygen sensor 361 of Epp et al. has the

ability to control the oxygen input into the burner 220 of Verrill et al., then the cryogenic pump 357 of Epp et al. must be included. This combination of an oxygen sensor 361 with a cryogenic pump 357 drawing oxygen from a liquid oxygen storage container 308 is not disclosed in the present invention.

In light of the above remarks, reconsideration and allowance of claim 25 under 35 U.S.C. §103(a) over Verrill et al. in view of Epp et al. is requested.

Remarks Directed to Rejection of Claim 15 under 35 U.S.C. §103(a) over LaPierre et al. in View of Keskar et al. and Further in View of Prasad

LaPierre is cited as teaching all of the elements of claim 29 with the exception of a feed liquid compression means to convey the mixed gas to the reactor. The teaching of Keskar et al. in combination with LaPierre et al. is not detailed in Paper No. 20060810 even though the notation "LaPierre '278 in view of Keskar '591" is consistent with this intent. However, as none of the prior art references of LaPierre, Keskar, or Prasad teach or contemplate the needle valve of claim 29, the lack of discussion as to Keskar is moot as claim 29 and those that depend therefrom are now in allowable form. To bolster the teachings of LaPierre et al., Prasad is cited as teaching a compressor 2 used to elevate the pressure of the feed gas to the desired upper membrane pressure to facilitate the separation process.

Claim 15 depends from claim 29 which is now believed to be in allowable form. On the basis of this dependency, claim 15 is likewise believed to be in allowable form. Additionally, Applicant submits that there is no motivation in the prior art of record for two stage pumping and compression of the feedstock.

In light of the above remarks, reconsideration and withdrawal of the rejection as to claim 15 under 35 U.S.C. §103(a) over LaPierre et al. in view of Keskar et al. and further in view of

Prasad is requested. In the event this rejection is maintained, it is respectfully requested that the details of the reference combination of LaPierre et al. and Keskar et al. be stated with greater clarity.

Remarks Directed to Rejection of Claim 30 under 35 U.S.C. §103(a) over LaPierre et al. in View of Keskar et al. and Further in View of Han et al.

LaPierre et al. and Keskar et al. are cited as teaching all of the elements of claim 29 and claim 30 with the exception of a mix controller to adjust the ratio of the raffinate and the air to the burner. As detailed above, the combination of LaPierre et al. and Keskar et al. is deficient with regard to the needle valve of claim 29. To bolster the teaching of LaPierre et al. and Keskar et al., Han is cited as teaching a mix controller with a raffinate controller 23 and an air/fuel control valve 2 to regulate the amount of gas mixture to the catalyst burner 9 to be utilized as a fuel source, which increases the energy efficiency of the fuel reformer.

With respect to claim 30, the pressure controller 23 of Han et al. is used to control the pressure of hydrogen separation reaction chamber 7 and valve 2 supplies fuel which does not permeate through metal films 11 in the unit modules to a combustion catalyst chamber in the respective unit modules. A combination of LaPierre et al. and Keskar et al. with Han et al. provides for a pressure controller 23 which controls the pressure of hydrogen separating membrane 14 or possibly reforming reactor 12 and a valve 2 that supplies fuel thereto. This combination does not provide for a mix controller adjusting the ratio of said raffinate in said air provided to a burner.

In light of the above remarks, reconsideration and withdrawal of the rejection as to claim 30 under 35 U.S.C. §103(a) over LaPierre et al. in view of Keskar et al. and further in view of Han et al. is requested. In the event this rejection is maintained, it is respectfully requested that

the details of the reference combination of LaPierre et al. and Keskar et al. be stated with greater clarity.

Remarks Directed to Rejection of Claim 31 under 35 U.S.C. §103(a) over LaPierre et al. in View of Keskar et al. and Han et al. and Further in View of Epp et al.

LaPierre et al. in view of Keskar et al. and Han et al. is cited to disclose the claimed invention of claim 31 with the exception of an oxygen sensor. Epp et al. is cited to bolster the teachings of LaPierre et al. in view of Keskar et al. and Han et al. by providing an oxygen sensor 361 at the burner outlet stream 321 of the catalytic burner 319 to maintain the oxygen concentration of the burner outlet stream and control the amount of oxygen to the burner via pump 357.

With respect to claim 31, as this claim depends from claim 30 which is now believed to be in allowable form, on the basis of this dependency claim 31 is likewise believed to be in allowable form.

In addition, the combination of the oxygen sensor of Epp et al. with the teachings of LaPierre et al. in view of Keskar et al. and Han et al. provides for an oxygen sensor that controls the amount of oxygen to the burner via a cryogenic pump 357 which draws oxygen from a liquid oxygen storage container 308. The cryogenic pump 357 and the liquid oxygen storage container 308 are not disclosed in the present invention.

In light of the above remarks, reconsideration and withdrawal of the rejection of claim 31 under 35 U.S.C. §103(a) over LaPierre et al. in view of Keskar et al. and Han et al. and further in view of Epp et al. is requested.

Remarks Directed to Rejection of Claim 34 under 35 U.S.C. §103(a) over LaPierre et al. in View of Keskar et al. and Further in View of Edlund et al.

The basis of the rejection is that LaPierre et al. in view of Keskar et al. teaches the claimed invention with the exception of a feed pump controller to adjust feed rate in response to hydrogen output pressure. As the relevant teachings for which Keskar et al. is cited are not disclosed, the liquid pumps are disclosed within LaPierre et al. with respect to reference numerals 85 and 86 of Fig. 1, it is assumed that Keskar et al. is immaterial to the basis of this rejection. As base claim 29 is now believed to be in allowable form on the basis of the inclusion of a needle valve nowhere found in LaPierre et al., Keskar et al. or Edlund et al., claim 34 which depends therefrom is submitted to also be in allowable form.

In addition, Applicant submits that Edlund et al. while showing a controller sensors associated with the hydrogen output and feed assembly, Applicant submits that the subject matter of claim 34 is in fact different in that feed rate is adjusted with respect to hydrogen output pressure not total hydrogen output as detailed in Edlund et al. As maintenance of pressure affords more efficient operation of the inventive system relative to the throughput sensing of Edlund et al., Applicant submits that the subject matter of claim 34 is patentable separate from dependency from claim 29 now believed to be in allowable form.

In light of the above remarks, reconsideration and withdrawal of the rejection as to claim 34 under 35 U.S.C. §103(a) over LaPierre et al. in view of Keskar et al. and further in view of Edlund et al. is requested.

Remarks Directed to Rejection of Claim 36 under 35 U.S.C. §103(a) over LaPierre et al. in View of Keskar et al. and Further in View of Edlund et al.

As the teachings for which Keskar et al. are cited to bolster LaPierre et al. are not included and LaPierre et al. has previously been cited for teaching all the elements of claim 36

with the exception of a fuel flow controller, Applicant hereby incorporates by reference the remarks made of record in the response filed June 6, 2006 with regard to this claim. As base claim 29 recites a needle valve nowhere taught nor contemplated in LaPierre et al., Keskar et al. or Edlund et al., in each of the references alone or in combination, claim 36, which depends therefrom, is also now believed to be in allowable form.

In light of the above remarks, reconsideration and withdrawal of the rejection as to claim 36 under 35 U.S.C. §103(a) over LaPierre et al. in view of Keskar et al. and further in view of Edlund et al. is requested.

Remarks Directed to Rejection of Claim 20 on the Grounds of Nonstatutory Obviousness-Type Double Patenting over Claim 1 of U.S. Patent No. 6,923,944 in View of Keskar et al.

In light of U.S. Patent No. 6,923,944 failing to disclose the raffinate compressor disposed in fluid communication with the outlet, Applicant submits that inclusion of the raffinate compressor in pending claim 20 renders this claim patentably distinct over claim 1 of U.S. Patent 6,923,944. As to the teachings of Keskar '591, the proffered amendments to claim 20 indicating that the pressure downstream from the raffinate compressor is increased relative to that received by the raffinate compressor via the outlet channel actually teaches away from such a system where the inlet pressure to venturi eductor is greater than that downstream therefrom.

Lastly, the necessity of invoking the teachings of Keskar et al. so as to maintain nonstatutory obviousness-type double patenting rejection of claim 1 is respectfully submitted to indicate as a matter of law that the nonstatutory double patenting rejection is improper as claim 1 of U.S. 6,923,944 in and of itself neither anticipates nor renders obvious by itself pending claim 20.

In light of the above remarks, reconsideration and withdrawal of the rejections to claim 20 on the basis of nonstatutory obviousness-type double patenting over claim 1 of U.S. Patent 6,923,944 in view of Keskar et al. is requested.

Summary

Claims 15, 20-22, 25, 29-37 and 39 are submitted for reconsideration. Each claim is believed to be in allowable form and directed to patentable subject matter. Claims 20, 29 and 33 have been amended. Reconsideration and withdrawal of the outstanding rejections and the passing of this application to issuance are solicited. Should the Examiner have any suggestions as to how to improve the form of the pending application, it is respectfully requested that the undersigned attorney in charge of this application be contacted.

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Respectfully submitted,

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